Sask research

FIRST
25
YEARS

SASKATCHEWAN
RESEARCH
COUNCIL

T. E. Warren, B.A.; B.Sc.; M.Sc.; Sc.D.
Director
Saskatchewan Research Council
1956-1972

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FIRST 25 YEARS

Avord Tower,
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Dr. T. E. Warren,
Director,
Saskatchewan Research Council,
University of Saskatchewan,
SASKATOON, Saskatchewan.
S7N OX1

Dear Dr. Warren:

On behalf of the Government and people of Saskatchewan, I would like to extend heartiest congratulations to you and the staff of the Saskatchewan Research Council on its anniversary of 25 years of service.

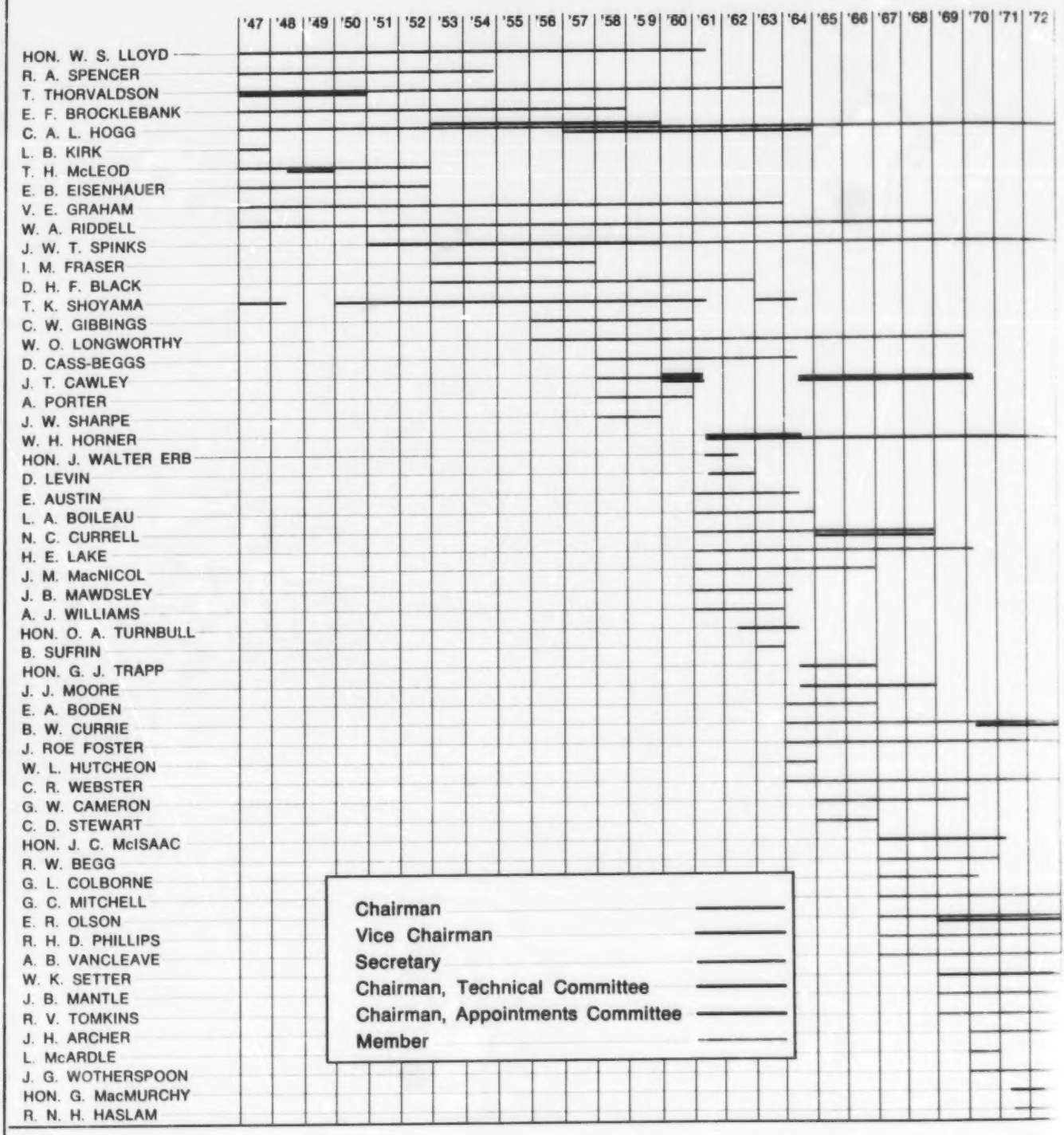
I would like to express to you in particular our sincere appreciation of the key role you have played since 1956. Your success in defining a continuing program of pure and applied research, and in developing a staff which has gained national recognition has been outstanding. I hope that, even in retirement, you will continue to give us the value of your experienced counsel.

This review testifies to the pride which Saskatchewan people can feel in light of the achievements of the Council under your leadership.

Yours sincerely,

Gordon MacMurchy,
Chairman and
Minister-in-Charge,
Saskatchewan Research Council.

COUNCIL MEMBERS 1947 - 1972



WHY HAVE A RESEARCH COUNCIL?

Saskatchewan, sprawling larger than 70 per cent of the world's countries yet containing scant of a million people, blessed by rich land and cursed by huge distances to major markets, renowned for its unspoiled landscapes and shunned for its harsh climate is an exciting place to be! We have unique riches in things ranging from huge potash beds to teeming flocks of wild ducks. We have special problems too, like moving millions of bushels of grain and finding water on the sun-baked prairie.

Because of our complex natural environment and because of our particular economic conditions special, new technologies are required to maintain and improve the quality of life in this province. Since the problems occur *here* and few people outside Saskatchewan have similar needs the work must be done here to be effective.

To further this end, the provincial government brought the Saskatchewan Research Council into being 25 years ago. From its Saskatoon laboratories, the Council's 98-man staff which includes chemists, engineers, geologists, physicists and information and management specialists, is currently involved in 76 different projects. Rather than examining individual projects, let us examine some *project areas*.

MINERAL RESOURCES RESEARCH was centralized at the Saskatchewan Research Council in 1958 when the Department of Mineral Resources, Industrial Minerals Branch, was transferred from its old Regina site (shown above) to SRC's new Saskatoon laboratory.

SRC HEADQUARTERS, occupying 30,000 square feet, located on the Saskatoon campus of the University of Saskatchewan, houses laboratories for analytical chemistry, organic chemistry, inorganic chemistry, surface and groundwater, hydrology, geochemistry, geophysics, electronics, atmospheric physics, environmental physics, ceramics and geology. In addition a pilot plant, a machine shop, a precision instrument shop, conference room, library and office facilities are contained in the headquarters complex.

WATER

Water studies have long been a concern at the S.R.C. In rural Saskatchewan, water is a limiting factor not only for crop production but also for home use, livestock and the amenities of life.

An estimated quarter-million wells have been dug in this province to help meet water needs. Two cities, Lloydminster and Yorkton, draw their

WATER SUPPLIES are one of the keys to successful farming. A well on a farm near Outram is pump tested to assess the potential of wells in the area to meet water needs.

water exclusively from wells, while Regina and North Battleford have obtained up to 60 per cent of their requirements from groundwater sources.

Surface water too is of great importance to Saskatchewan and Saskatchewan's sloughs and dugouts are of interest to people far beyond the province's borders. More than half of North America's wild ducks stop in Saskatchewan during the course of their annual migration. The livestock population stood in excess of 2,100,000 animals in 1970 and is forecast to increase by 1,000,000 animals during the next decade. Dugouts are a good method of supplying water for stock in some situations.

Atmospheric sources provide the largest supply of water to Saskatchewan. Evaporation exceeds rainfall by more than four inches in some areas, so water stored after spring snowmelt is required for agricultural production. A fraction of the rain and snow water finds its way deep underground where it recharges wells. Since wells are continuously replenished, it is possible to *manage groundwater as a renewable resource.*

Unlike many areas in North America most of Saskatchewan's water quality problems are of *natural* rather than man-made origin. Glaciers that virtually covered the province 12,000 to 20,000 years ago churned up saline, marine bedrocks. Deposits derived from these now lie at various depths below today's ground surface. Rainwater and snowmelt passing through these deposits pick up salts. A few small lakes in this province into which saline groundwater discharges are more salty than the Dead Sea.

These are some of Saskatchewan's water problems. What is the Saskatchewan Research Council doing to solve them?

More than 800 testholes have been drilled in the search for groundwater, sampling sub-surface conditions throughout 140,000 square mile portion of the province south of the Precambrian Shield. Findings from these testholes are mapped at a scale of about four miles to the inch. These *Geology and Groundwater Resources* maps provide information concerning the maximum practical depth at which water might be found, the various geological units encountered from the surface to the base of exploration and data showing units likely to contain water, together with some indications of water quality.

TEST DRILLING provides the geologic framework for groundwater studies in Saskatchewan. A typical site, near Kyle, includes the contracted drilling rig (centre) field office and living quarters for an SRC geologist and the contractor's crew (left) and SRC geophysical logging personnel (right). This high degree of mobility is required for as many as three sites per day may be drilled during the summer field season.

CHEMICAL ANALYSIS INSTRUMENTS, such as the atomic absorption spectrophotometer operated by Lloyd MacDonald, permit SRC to undertake analysis of 42 chemical elements present at the parts-per-million level or less. About 100 samples per hour can be handled for a single element. SRC analytical facilities are available to clients from Saskatchewan and elsewhere on a fee-for-service basis as well as for providing support to the Council's research program.

Water quality improvement can be a costly business as the expenditure of a great deal of energy is required by the traditional methods of removing undesirable salts from water. If salty water forms ice, the fraction that freezes first is quite pure water while the fraction that freezes last is the saltiest. Free freezing of salty water is achieved when outdoor reservoirs are filled during the autumn and winter. Salty water can be separated from relatively pure water during either the freeze-up or melt periods. Research Council studies towards utilizing this effect are well advanced.

A SPRAYER METHOD of freeze desalination is under study at SRC. This equipment, designed for use by individual farmers, utilizes free refrigeration supplied by Prairie winters to partially separate salts from water.

Sloughs, based on depressions formed where stagnant glacial ice melted, play a major role in Saskatchewan's surface water supply picture. (In that part of the province lying south of Prince Albert National Park, only the North and South Saskatchewan Rivers maintain useful *year-round* flow.) In the past 20 years the number of sloughs filled in July ranged from 200,000 to 4,000,000. At present there are 125 sloughs in five different areas under study by the S.R.C.

The slough study areas have been chosen to take into account differing soil, climatic, landscape and vegetation conditions. Over a period of many seasons, sufficient data can be gathered to mathematically model slough behaviour. Analysis of evaporation loss from sloughs has already been completed.

What benefits have been realized from this research work?

- S.R.C.-produced groundwater data is used in the design of 60 per cent of Saskatchewan's new wells, a conservative estimate shows. In recent years about $1,000,000 is invested annually in new water wells.

- At the beginning of the groundwater program only one Saskatchewan water well drilling contractor had the electric-logging equipment required to make effective use of S.R.C. groundwater data. Now seven others have bought logging gear so that both drillers and their clients can profit by using the S.R.C. information.

- New groundwater resources, such as the Swan River aquifer with 50 times the storage volume of Lake Diefenbaker, have been delineated.

- On the basis of a survey conducted by the Saskatchewan Department of Agriculture at seven representative community pastures, costs of developing water supplies for livestock average $17.70 per animal. A major water research effort is justified as a small fraction of the $17,000,000 investment required to provide water supplies for the forecast increase in the cattle population.

- The Saskatchewan Water Resources Commission reported that 45 per cent of the province's 220,000 persons who live in communities of 10,000 or less use water supplies containing more than 1,000 parts per million (ppm) total dissolved solids (TDS). Twenty per cent of these people are forced to use water worse than the 1,500 ppm TDS tolerance limit. The provincial standard, where costs are not prohibitive, is 600 ppm TDS. Work elsewhere indicates that saline water is responsible for a penalty cost of at least $4.00 per household per year due to increased appliance and plumbing failures. Animal weight gain proceeds 14 to 21 per cent more slowly on highly saline water. The S.R.C.-developed freeze desalination technique, which is now ready for implementation, holds considerable promise of alleviating many of these undesirable conditions.

WATER QUALITY STUDIES involving 2,000 wells over a grid of 326 townships and surface water samples from 123 lakes, rivers and creeks have been analyzed in the course of an ARDA-assisted program at SRC. Chemist Andy Rutherford is shown taking out a sample for further analysis.

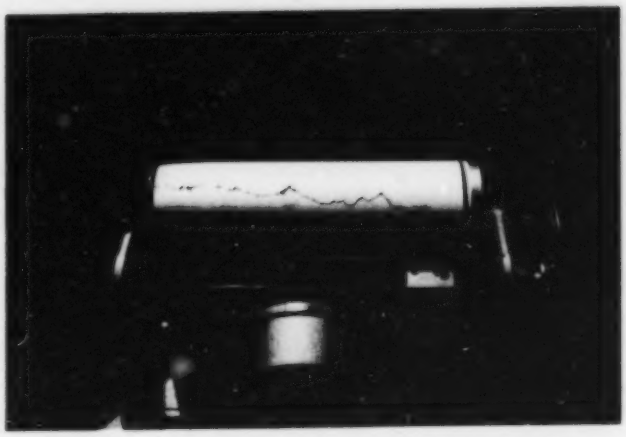
Is more water research needed?

Yes. Despite the major research effort on water problems, made possible largely by support under the Agricultural and Rural Development Act, much remains to be done. Preliminary studies show that most rural wells yield only 1 to 10 per cent of the water that they are capable of producing. Much more information concerning the basic techniques of well construction is urgently required to remedy this situation.

Some programs, such as the slough studies, require many seasons of data to include most of the variations that nature is capable of producing. Other programs, such as the groundwater resources mapping and freezing desalination work require short-term effort to wind them up.

THE ENVIRONMENT

Today there is a widespread concern about pollution in many parts of the world. A vital factor required before pollution can be studied intelligently is a description of the natural environment so the *changes in natural conditions brought about by human intervention* can be accurately catalogued and their consequences observed and reported.



OBSERVATION WELLS, numbering 30 throughout the province's populated area, monitor groundwater levels to determine the effects of climate and well development on the water table level. Commercial recorders, modified, serviced and maintained by SRC, continuously record water level changes.

WEATHER OBSERVATIONS are taken regularly at the SRC benchmark climate station. Weather observer Joe Calvert records the data daily. The SRC climatological reference station is one of three such sites in Canada established with the aid of the Atmospheric Environment Service.

The Saskatchewan Research Council is engaged in a variety of such studies. Man's activities are constantly changing in regard to the *amount* of material he adds to or takes from the environment. Also the *type* of inputs and outputs change with time. Programs involving monitoring of changes in the environment *must* be long-term to be useful.

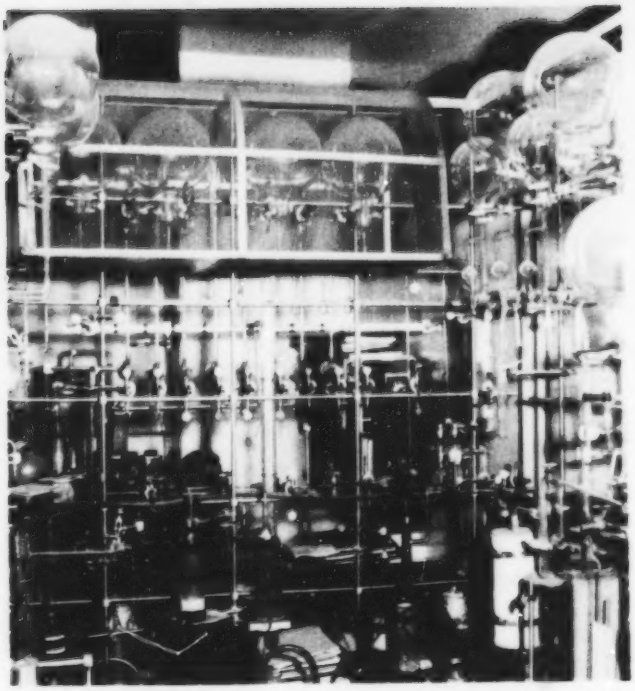
An example of an on-going S.R.C. activity in the field of environmental monitoring is the network of 30 measuring wells that monitor changes in groundwater resources in the southern 100,000 square miles of the province. Data from this network is used in preparing an annual forecast of groundwater level trends.

The weather has profound effects on our water resources, crops, transportation systems and the quality of life in Saskatchewan. Temperatures as high as 113°F and as low as −70°F have been recorded here. Winter snowfalls have ranged from as much as 124 inches to not quite 4 inches. To facilitate accurate record keeping, the Council operates a climatological reference station at Saskatoon where different weather measurement techniques and instruments are compared. In addition, special studies of the effects of landscape on the weather have been carried out at various sites.

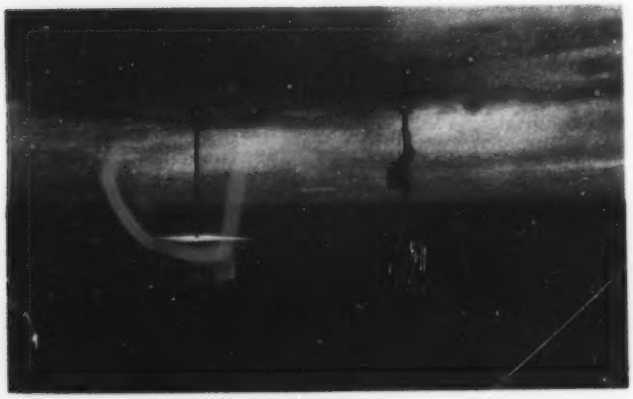
The weather plays an important role in determining drift patterns for pesticides used in agricultural sprays. It has been estimated that 1,000,000 pounds of 2,4-D alone drift away from the fields in which they are released in the course of a single spraying season. This quantity represents a direct loss of $600,000 per year to farmers. It also places an undesirable chemical load on

the environment. The Saskatchewan Research Council is a major participant with Canada Agriculture, in a program to develop new spraying technology to reduce the amount of pesticides sprayed off target.

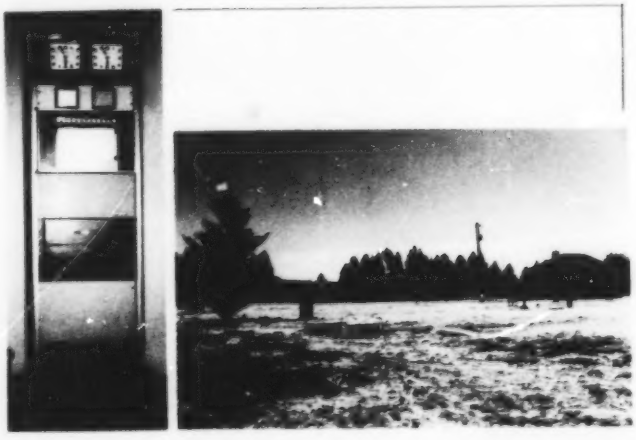
Naturally radioactive components of the environment provide valuable clues concerning the age of various materials. Radioactive carbon dating performed at the S.R.C. (and only one other Canadian centre) provides useful information to geologists concerning the age of deposited materials. Archeologists and museum curators find carbon dating helpful in confirming the dates assigned to man-made objects. Tritium (a naturally occurring radioactive form of hydrogen) is more abundant in water that has just fallen as rain than in water locked up underground or as ice. Tritium determinations can be used to study problems



NATURALLY RADIOACTIVE carbon-14 from an object to be dated is converted to acetylene gas by Jurgen Wittenberg prior to assessing the object's age by counting the number of radioactive carbon atoms decaying. SRC operates one of Canada's two carbon dating centres.



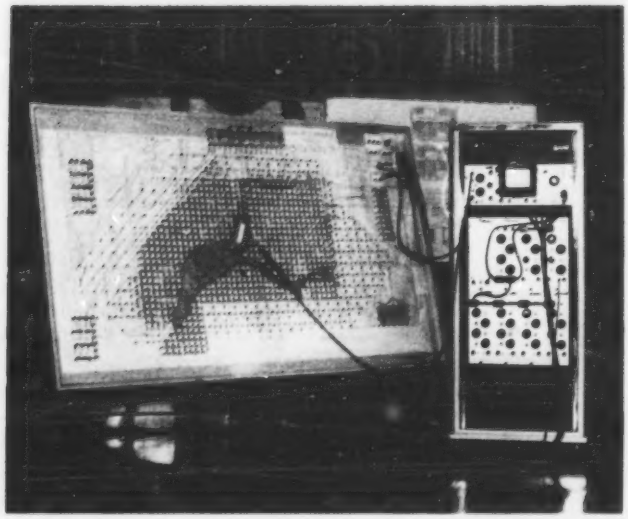
PESTICIDE DRIFT is monitored in a field near Aberdeen, as part of SRC's program of spray equipment improvement. These activities are financed in part by the Canada Department of Agriculture.



AUTOMATIC RECORDING of weather information is done by SRC-built electronic instruments (left) at the Duck Lake, Sask., observation well site. Greater knowledge of the relationship between the weather and water levels will assist better management of ground water resources. An abandoned schoolyard (right) is the site of SRC's hydrometric station near Duck Lake.

such as whether the groundwater near a lake supplies the lake or whether the lake supplies the groundwater.

Short-term environmental studies for special purposes have a place in the Council's program too. Recently completed work of this type includes geological and climatological studies in support of the Conquest irrigation project and a compilation of groundwater resources in the Saskatchewan portion of the Saskatchewan-Nelson basin. The latter work was performed under contract as part of a major inter-governmental development now under study for the basin area.



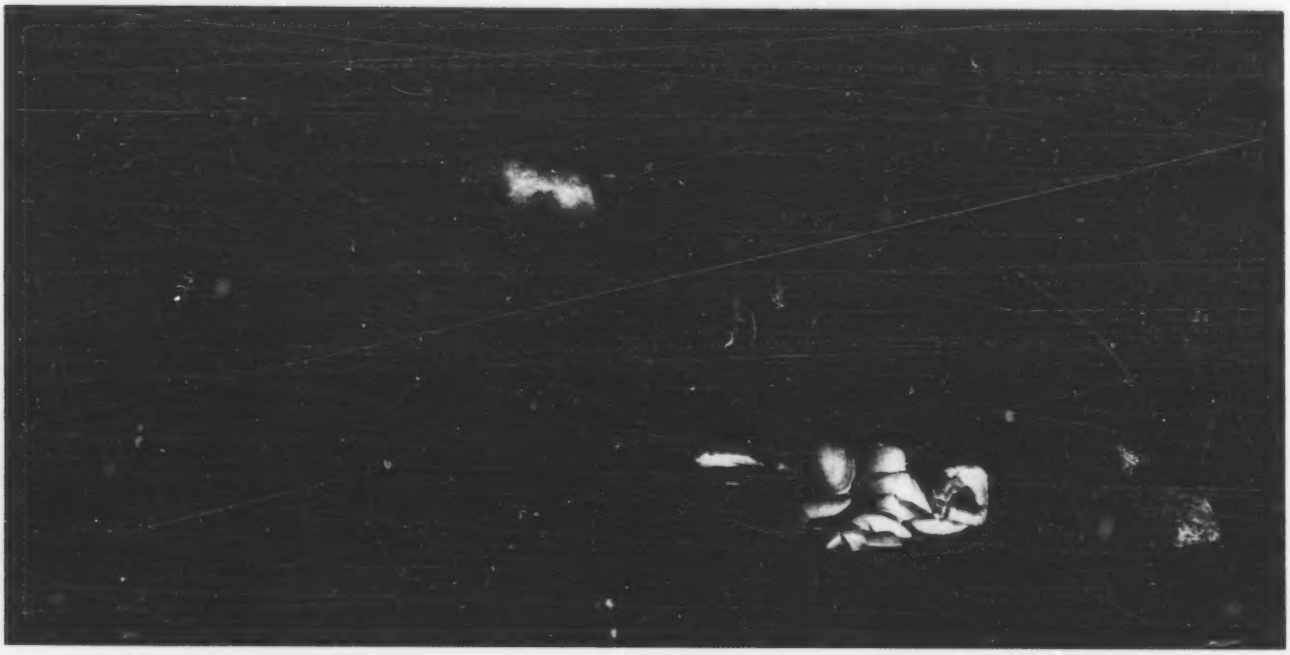
ELECTRICAL ANALOG MODELS are constructed at SRC using geological data collected in Council field studies. This model of the Conquest irrigation reservoir can be used to predict the interaction between wells in the area and water level in the reservoir.

As well as programs to define and monitor the environment, the Council has variety of programs concerned with products that are particularly well adapted to our environment or that are easily derived from it.

Hardy Prairie weeds are certainly well adapted to the environment. Some of these weeds are far richer in protein (30 per cent to 40 per cent protein in some cases) than are traditional crop plants. Also, some wild plants are rich in oils that chemically resemble rapeseed or safflower oils. However, many of these plants contain undesirable components (saponins) that make them indigestible. Chemical processes that will eliminate these saponins and render wild plants suitable for providing animal feeds are under study at the S.R.C. Some successes at the laboratory scale have already been attained.

INDIAN LEATHERCRAFT is an item in high demand but native craftsmen are limited by the processes involved in tanning hides by traditional methods. Studies directed towards making small scale hide processing less laborious are under way at SRC. Chemist Ewen Coxworth (right) shrink tests a portion of a tanned hide while hide evaluators Mrs. Mary Ann McKay (centre) and Mrs. Muriel Ross of La Ronge look on.

Our native people in the northern part of the province find it easy to market their traditional handicrafts throughout North America. The demand for leather goods is such that shortages of native-processed hides limits the craftsman's output. In an effort to alleviate this situation, Indian craftsmen are working at the Council evaluating hides that have been processed by new technologies. The new methods are suitable to bush operations but are much less laborious than traditional techniques.

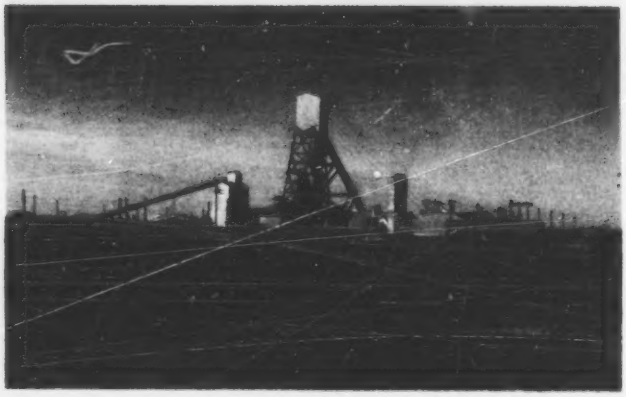


MINERALS

In the 5-year period 1966-70 the total value of Saskatchewan Mineral production exceeded $1.8 billion. In the same period, sales of Saskatchewan potash outside Canada have earned more than $470,000,000 in foreign exchange. At the Research Council unique programs have been devised to meet the special needs of our mineral industry.

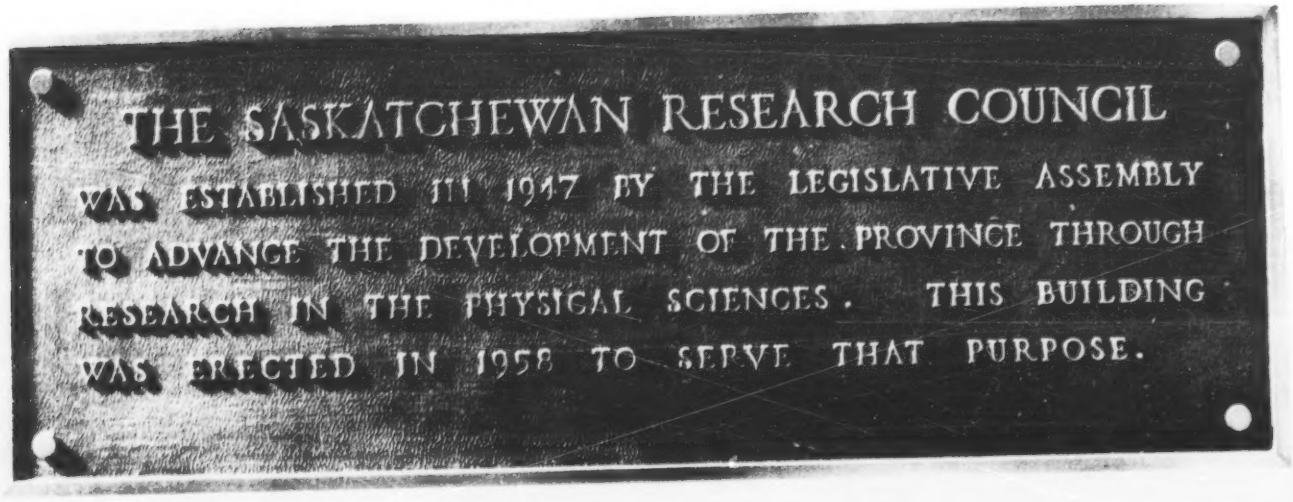
Potash is perhaps our most unusual mineral resource. Saskatchewan reserves, estimated at 6.4 billion tons potassium oxide equivalent, represent a very substantial fraction of the world's known supply. The ore grade, which usually exceeds 25 per cent potassium oxide, is the highest quality large, uniform deposit found anywhere in the world.

World-wide, potash equivalent to about 15,000,000 tons of potassium oxide are used annually for fertilizer. Refined potash salts are used at the rate of about 1,000,000 tons annually in making pharmaceuticals, dyes, matches, television tubes, synthetic rubber, photographic film, insecticides, soaps, explosives, meat cures, rocket fuel, fluorescent lamps, refining magnesium metal and in other applications.



TEN POTASH MINES now operating in Saskatchewan, exemplified by the Alwinsal Potash of Canada operation near Lanigan shown here, are producing from world's largest known reserve of this mineral. The potash industry has been the subject of many studies at SRC.

Although potash was first identified in Saskatchewan in 1943 and development began in 1951, no mine achieved production until late 1958. Much new technology was required to meet the Saskatchewan situation. A problem associated with potash


THE SASKATCHEWAN RESEARCH COUNCIL
WAS ESTABLISHED III 1947 BY THE LEGISLATIVE ASSEMBLY
TO ADVANCE THE DEVELOPMENT OF THE PROVINCE THROUGH
RESEARCH IN THE PHYSICAL SCIENCES. THIS BUILDING
WAS ERECTED IN 1958 TO SERVE THAT PURPOSE.

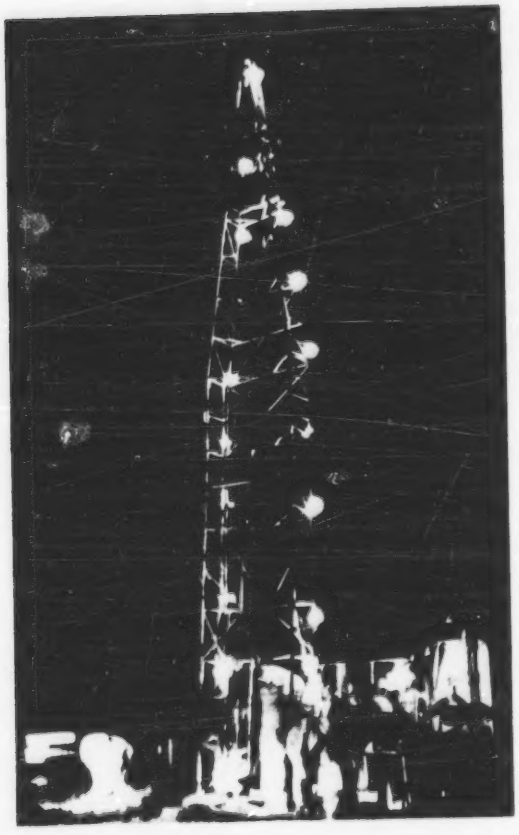


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Photo 1

CONSTRUCTION of SRC headquarters was begun shortly after a decision was made to have a Council staff. This centralized some government research functions. This view shows the building on September 28, 1957.

Photo 2

PHOTO MOSAICS, or composite aerial photographs, are required in many field investigations. Cartographer Bill Taylor (left) and Chuck Faulkner inspect a mosaic in preparation to ensure it meets exacting standards.

Photo 3

ROUND-THE-CLOCK DRILLING is often part of SRC's field program.

Photo 4

SASKATCHEWAN CLAY, such as that quarried at this site near Eastend, is marketed to brick and tile makers for distribution in the Prairie provinces and the northwestern United States. SRC maintains the province's only ceramics research facility.

Photo 5

INTERNATIONAL CO-OPERATION figures in SRC's program as exemplified by Basil Rochefort (right), World Meteorological Organization-sponsored scientist from the Caribbean Meteorological Institute, shown discussing a vertical wind tunnel with SRC cloud physicist John Maybank. The wind tunnel, designed and built at SRC, is used in laboratory studies of cloud seeding. Dr. Maybank, the wind tunnel designer, has recently returned from a leave-of-absence taken at a UN-sponsored project in the Caribbean.

Photo 6

CARTOGRAPHY is a vital part of SRC's facility to make research information available to the consumer. Clarence Elias (centre) and Mrs. Carol Bain (right) edit a proof of a comprehensive geological map of Saskatchewan prepared at SRC from information supplied by the Department of Mineral Resources and the Council's geologists. Carlos Sardinha (left) puts the finishing touches on a final printing negative. Scribing, a practice in which lines measured in thousandths of inches in width are accurately cut on plastic material, is done at SRC. This technique makes it easy to create very precise multi-color maps and graphical displays.

Photo 7

WINTER DRILLING is necessary to geologists who wish to investigate specialized geological features found beneath lakes, such as Crater Lake near Yorkton. An SRC-built geophysical logging unit (white truck box) is used in gathering information concerning the geology as it effects transfer of water through the lake bottom.

mining is in the area of rock mechanics. The design of excavations is critical; the rocks that make up the mine do not behave similarly in laboratory and mine situations.

Creep, the tendency of the rock material to continuous deformation, is not well understood. The creep phenomenon presents a problem to mine operation. No technology developed outside Saskatchewan is completely applicable to our problem. The S.R.C., in co-operation with the Department of Mineral Resources, and four of the mining companies have undertaken a research effort on this problem.

Once potash has been mined, it must be refined. Separating potash minerals from other constituents can be accomplished by flotation, that is using special techniques that allow the desired potash minerals to float and the undesirable material to sink. Work at the Saskatchewan Research Council is devoted to finding successful flotation agents for potash ore and the utilization of *wheat* starch, rather than the potato starch used in conventional flotation as a slime depressant.

Other projects at the Council deal with chemical processes used in forming a variety of potassium salts from potash.

It is noteworthy that virtually all Canadian research on potash is carried out in Saskatchewan and that the Saskatchewan Research Council is a major participant in many areas of the program.

The comprehensive program of study on the lignite resource furnishes an excellent example of how many S.R.C. specialists make contributions to different aspects of a major task.

Saskatchewan's lignite reserves, estimated in the 12 billion to 13 billion ton category, lie very close to surface and consequently can be mined very cheaply. Since lignite has a relatively low sulphur content, it is a particularly desirable fuel material from the air pollution reduction viewpoint.

We do not know how much of our lignite can be recovered economically. So far detailed exploration shows that ½ billion tons of lignite can be mined economically but specific information concerning most of the lignite resource is lacking. To provide the required data a joint study by the Saskatchewan Research Council, the Saskatchewan

SIDEWALL SAMPLING, or removing core samples at specified depths from the side of testholes drilled in the ground, greatly facilitates the Council's exploration programs for lignite and groundwater. The truck-mounted sampling tools, SRC-designed and built, have been purchased by the Alberta and Quebec governments and by the Department of Energy, Mines and Resources.

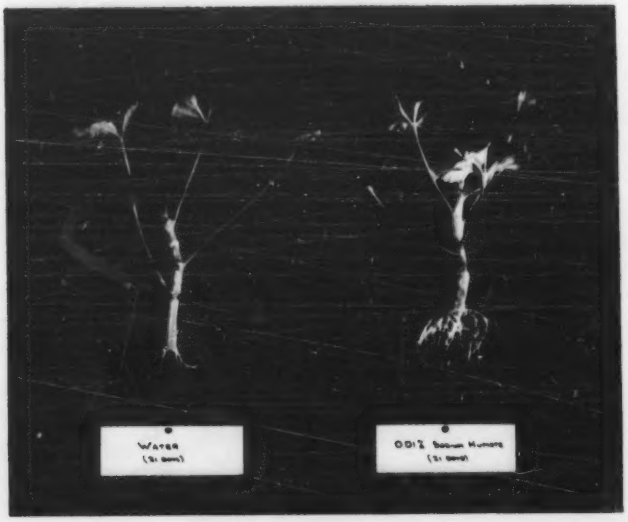
Department of Mineral Resources and the Canada Department of Energy, Mines and Resources has been undertaken.

If sufficient reserves of lignite can be proven economic, this fuel can supply much of the power requirement of Manitoba and western Ontario as well as the Saskatchewan community. Saskatchewan lignite shows promise of being among North America's cheapest solid fuels. Until the extent of Saskatchewan's reserve of economically recoverable lignite is known, electrical utilities in Manitoba and Ontario cannot consider this fuel in their development plans.

S.R.C.-sponsored studies on various aspects of the lignite resource have been underway since 1947. Currently, evaluation of geophysical borehole logging techniques, which have provided a powerful tool in groundwater prospecting, are being assessed as possible rapid, inexpensive methods for proving lignite reserves.

Techniques and data developed during the course of the Council's groundwater geology program have proved valuable in lignite evaluation

GEOPHYSICAL LOGGING studies are important in the Saskatchewan groundwater exploration program. An international study involving SRC's logging equipment (vehicle at left), and sidewall sampler (centre vehicle) and staff were joined by personnel and equipment of the U.S. Geological Survey at a site near Oxbow in one of the most comprehensive studies of geophysical prospecting for groundwater undertaken anywhere.



ROOT GROWTH is promoted by applications of sodium humate, a material associated with lignite. These experiments on geraniums were among the first in SRC's continuing assessment of lignite derivatives as plant growth stimulants.

activities. In addition, S.R.C. industrial engineers have been involved in studies of heavy equipment required for efficient strip mining.

Products associated with lignite, such as leonardite and fly ash, have also been under study. Leonardite, an oxidized material associated with lignite, stimulates plant root development. Work on this phenomenon is currently under way at S.R.C. Fly ash is a copious by-product of burning lignite. This waste material has a possible use in filtering sewage. Work evaluating the use of fly ash for this purpose has been carried out by the Council.

Other aspects of S.R.C.'s total program that touch on lignite resources are water studies and transportation research. An abundant supply of water near the coal fields is required if steam-generated electrical power is to be developed as cheaply as possible. Alternatively, the lignite itself may be shipped out to permit power production elsewhere. Pipeline methods of transporting lignite are under study by the Council.

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TRANSPORTATION

In Canada as a whole, about $1 in every $5 of the gross national product is expended on transportation. Even a higher proportion of Saskatchewan's gross provincial product is spent on transportation. Slurry pipelines, where labor is minimal, where there is a one-way flow characteristic, and outside weather does not hamper shipment, have many potential advantages for moving Saskatchewan primary products. Costs of moving some bulk commodities may become as low as ¼ to ½ cent per ton-mile, some experts predict.

One of the world's most elaborate slurry pipeline facilities has been set up at the Saskatchewan Research Council. Costs of this facility have been met largely through contracts with the Canadian Transport Commission and the private sector.

A SLURRY PIPELINE facility second to none has been established at SRC financed in part by contracts from private industry and the Canadian Transport commission. Mike Small records data gathered in experiments on carrying materials such as potash and lignite, suspended in a liquid.

Slurry pipeline transportation of material involves the suspension of materials like lignite, potash, sulphur, and iron ore in a carrier liquid such as water or petroleum. The slurry is then pumped to its destination and the liquid and solid are separated.

Another aspect of transportation research is a joint study by the Council and the Saskatchewan Department of Agriculture concerning a shallow burial, constant flow water system primarily for rural areas. Such systems, employing inexpensive plastic pipe technology, would minimize freeze-up hazards by keeping the water moving at all times.

INFORMATION AND MANAGEMENT SERVICES

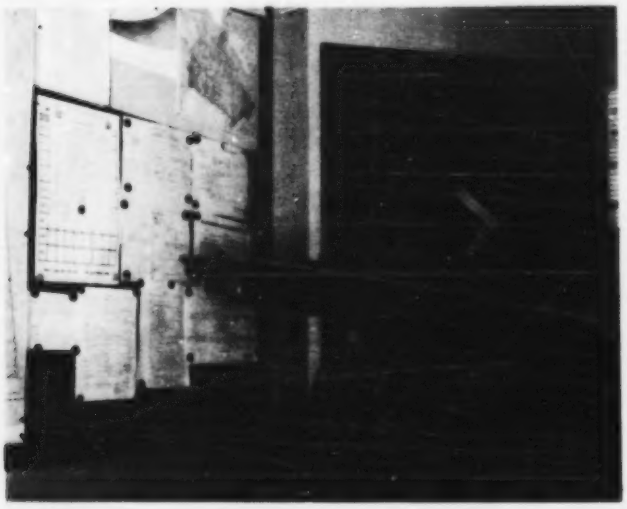
One of the most important programs at the Saskatchewan Research Council is its information and management services activity. It is also one where the benefits are most difficult to assess. This in part is due to the fact that the Council's technical information and industrial engineering services are offered on a free and *confidential* basis. This is made possible in large measure through the assistance of the National Research Council.

In the past year (1971-72), under the NRC-supported program, Council staff visited 354 Saskatchewan industries and answered in excess of 1,100 questions of a technical nature regarding industrial matters. Industrial engineering services, which are directed toward solution of specific problems at a given enterprise, were provided to 90 firms. In the last few years *demonstrable* savings realized by only two or three clients who received the most benefit in a single year would have more than offset the total cost of servicing the remaining hundreds of visits and inquiries.

Some specific benefits realized by Saskatchewan industry under the NRC-supported programs include:

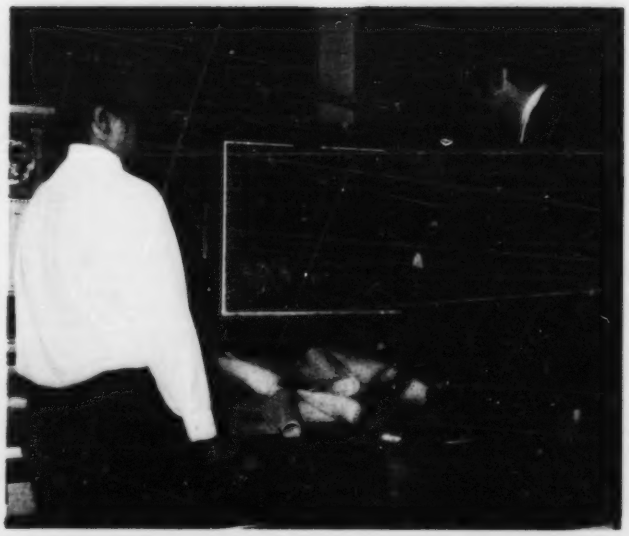
- a food processing company earned an additional $30,000 per *year* from a methods improvement study;
- an implement manufacturing company increased its profits by $200,000 in a certain year due to better purchasing procedures and higher efficiency;
- a food processor realized a $96,000 saving by more efficient utilization of freezer facilities;
- a chemical processor was able to locate a market for a material that was previously a waste product, thereby earning an extra $2,500 per month.

More than a million mailings have been made since the inception of the technical information and industrial engineering programs. Two regular publications, *The Catalyst* and *Industrial Business Management*, are sent to mailing lists of 5,000 and 3,000 respectively.



SASKATCHEWAN BUSINESSMEN are making increasing use of SRC technical information and industrial engineering services. Consultant Bernie Zuk (left) discusses sales and marketing methods with a businessman.

MINI-COMPUTERS do double duty at SRC. Hydrologists Jeff Whiting (seated) and Bill Schriek (standing) use this small computer for data processing during the winter. In summer the unit reads data directly from instruments set up along Idylwyld Drive, Saskatoon, where an urban drainage study was set up at the request of the Department of Highways.



COMPUTER GRAPHICS, graphs and maps produced from computerized information, are used at SRC to handle large amounts of data quickly. Here physicists John Bergsteinsson (left) and John Dyck (centre) discuss some material with Merv Richter of IBM.

Computer technology is required to handle the information explosion. A computerized index of potash literature is available through S.R.C. sources. Data banks containing some Saskatchewan environmental data are in the early stages of development.

In order that its research be effectively implemented, the Council offers special short courses on its groundwater findings to extension specialists, well drillers, health inspectors and others. Meetings are held in various rural districts from time to time to discuss groundwater problems with local farmers. An additional 300 or more requests for groundwater information reach the Council staff each year.

OTHER ACTIVITIES

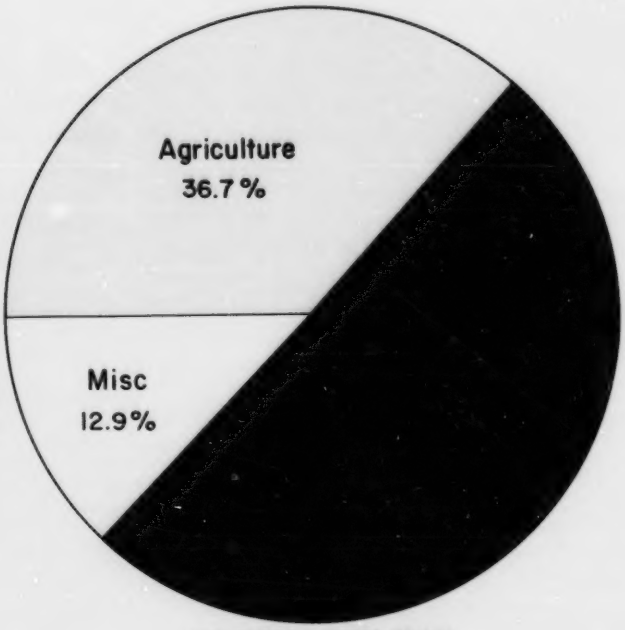
So far most of the discussion has focused on S.R.C. activities ongoing at the Council's twenty-fifth anniversary. There are a considerable number of completed programs that have been of significance to the province. Examples of these include:

- an atlas, the *Physical Environment of Saskatoon,* partly supported by N.R.C. and believed to be the most comprehensive study of this type attempted anywhere in anticipation of future needs;
- studies on the feasibility of a province-wide sewer and water system;
- pilot studies on farm weather forecasting;
- geochemical and geophysical surveys of major mineralized areas such as Hanson Lake and Lac La Ronge;
- a pre-development feasibility study of Anglo-Rouyn Mine at Wadin Bay.

The Saskatchewan Research Council has not operated its own laboratories throughout its 25-year history. Prior to 1958, the Council principally operated as a granting agency through support of selected, Saskatchewan-related research at the University of Saskatchewan. A program of S.R.C. grants to selected university research is still maintained. This allows the Council to support work

CANADA WINTER GAMES 1971 were faced with difficult environmental problems, such as those associated with safely parking thousands of cars on an ice sheet. Ice deflection measurements at the ski area parking lot were supervised by SRC hydrologist Bill Meneley.

ALGAL BLOOMS, a nuisance in lakes of the Qu'Appelle system but of potential economic importance as animal feed, are the subject of study by Professor D. R. Cullimore of the university's Regina campus. These studies are supported by an SRC research grant.



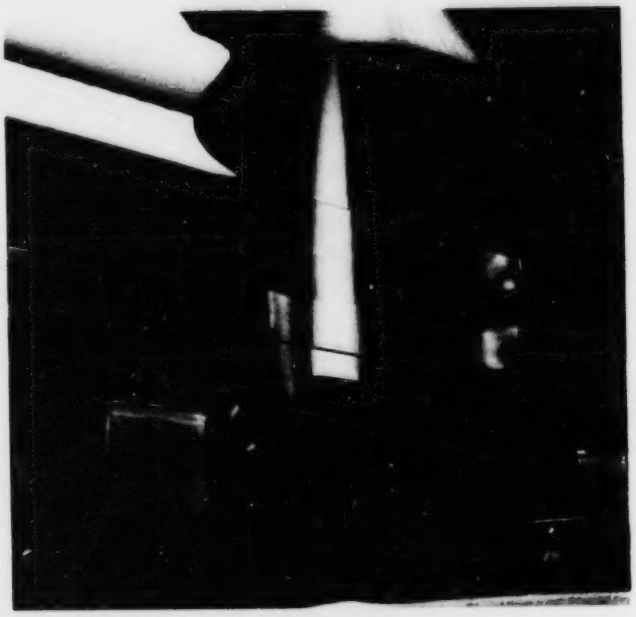
DISBURSEMENT OF SRC GRANTS

in such areas where there is at present no S.R.C. expertise, like agriculture, pharmacy, home economics and veterinary medicine, or some specialized in areas of chemistry, geology or engineering. Research programs at the Council and the University are complementary.

Council studies are assured of continuity, so necessary for long-term programs, while university research is dependent on both a professor and one or more graduate students showing interest in a particular program at an appropriate time.

Details concerning the University grant program are shown in the accompanying graph. It is noteworthy that some 500 projects have been supported at a total cost approaching $1,000,000.

Several projects, not included in the above total, are selected for special mention. Environmental studies involving blue-green algae (especially at Buffalo Pound Lake) and work involving the effects of potash dust on soils and standing crops have been carried out by the University's biology department and College of Agriculture respectively. The former project was funded at $52,000 by the Saskatchewan government and administered by the Council. The latter, an ongoing program, is funded by the Saskatchewan Mining Association and S.R.C.



TRACE ELEMENTS, present in minute quantities in lake sediments, water, soils and rock can act as pathfinders in mineral exploration. A wide-ranging SRC program in the northern part of the province uses specialized equipment, such as the unit shown above, in a geochemical survey.

BEHIND THE SCENES

How does the Saskatchewan Research Council do business? The Council's first duty is to the well being of Saskatchewan's people. All projects undertaken must relate to this task. A governing body chosen from distinguished scientists, businessmen and senior government officials acts as the S.R.C.'s board of directors. This body is chaired by a cabinet minister. All projects are reviewed by a technical committee of the governing body and are submitted to the directors for approval.

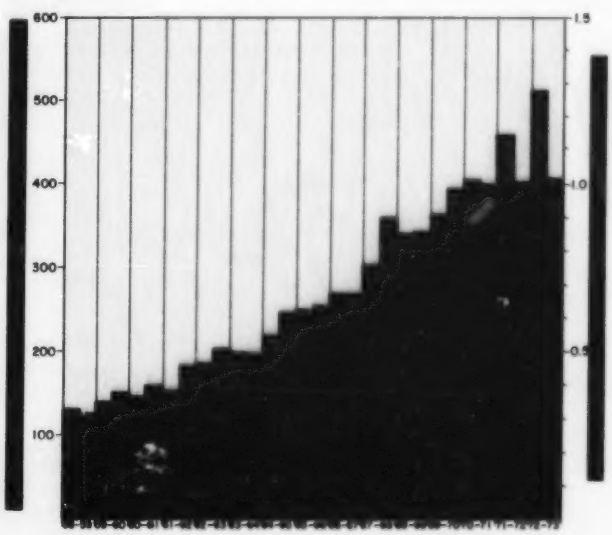
Most of the money disbursed by S.R.C. is provided from the provincial budget. An increasing portion is provided by contracts, grants and fee-for-service undertaken on behalf of private industry or of government departments.

In selecting contract projects, priority must first be given to the province's total interest. Important work cannot be sacrificed merely for the sake of contract earnings. If there is no conflict of interest with ongoing programs, contracts are chosen so that those with greatest total return to the province are given priority. However, care is taken so that the Council does not compete unfairly with qualified private consultants from this province. Recently, the Council's disbursements *within the province* have *exceeded* the amount of the S.R.C. grant from the provincial government by more than $250,000. (About 85 per cent of all S.R.C. revenue is disbursed in Saskatchewan.)

Most of our staff are Saskatchewan-born and educated. This helps to foster an acute awareness of Prairie problems shown by the scientific staff.

Quoting from a special study for the Science Council of Canada by Andrew H. Wilson entitled *Research Councils in the Provinces: A Canadian Resource:* "With the exception of the Ontario Research Foundation, the other Research Councils are in provinces which experience net outflows of scientifically and technically trained people. The Councils represent opportunities to stem the flow a little — and to encourage experienced people to return. However, the Councils have had relatively few openings in recent years . . ."

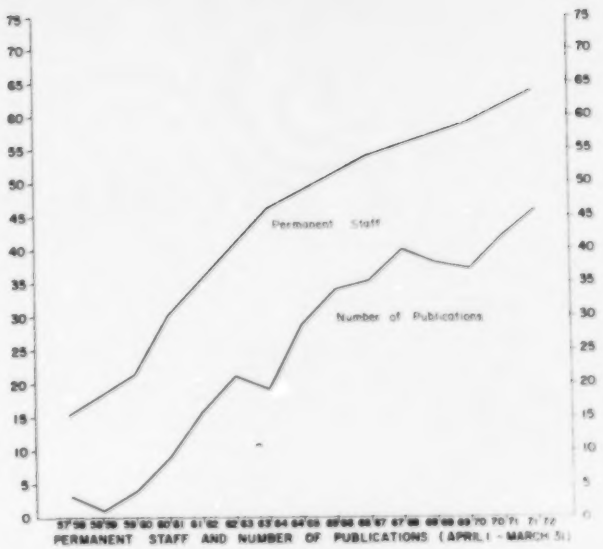
Evidence of the staff's capabilities is the representation of Council scientists on bodies such as Saskatchewan Air Pollution Advisory Committee, the Saskatchewan Potash Conservation Board,



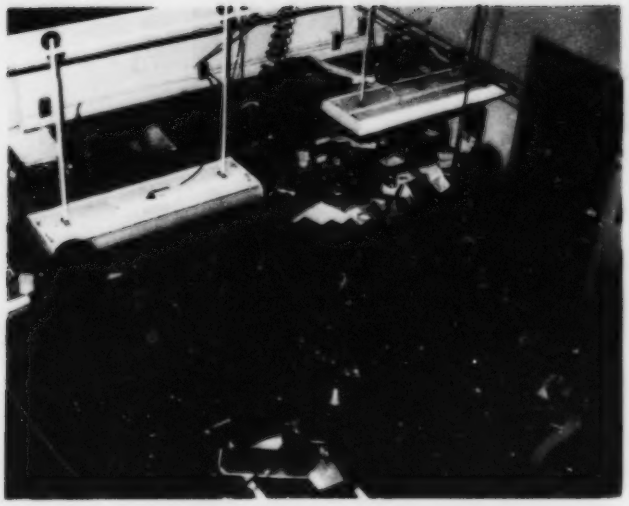
PROVINCIAL GRANTS AND TOTAL REVENUE
(MILLIONS OF DOLLARS)

the Canada Committee on Agricultural Meteorology, the National Research Council Associate Committee on Meteorology, the N.R.C. Associate Committee on Geology, the Water Studies Institute, the Saskatchewan Inter-Agency Committee on Remote Sensing, the Saskatchewan Agricultural Engineering Advisory Committee, the Advisory Board of the Saskatchewan Institute of Applied Arts and Science, and many others. It is noteworthy that Council staff sit on these bodies as highly qualified scientists and concerned citizens since S.R.C. has no regulatory or enforcement functions.

Council staff members hold university appointments as adjunct professors or research associates in the departments of chemistry, physics, geology, geography, plant ecology and electrical engineering; others have lectured in mathematics and industrial engineering.



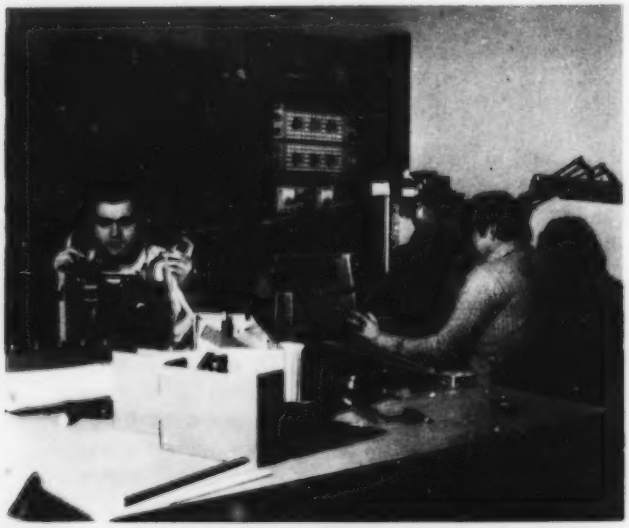
PERMANENT STAFF AND NUMBER OF PUBLICATIONS (APRIL 1 - MARCH 31)



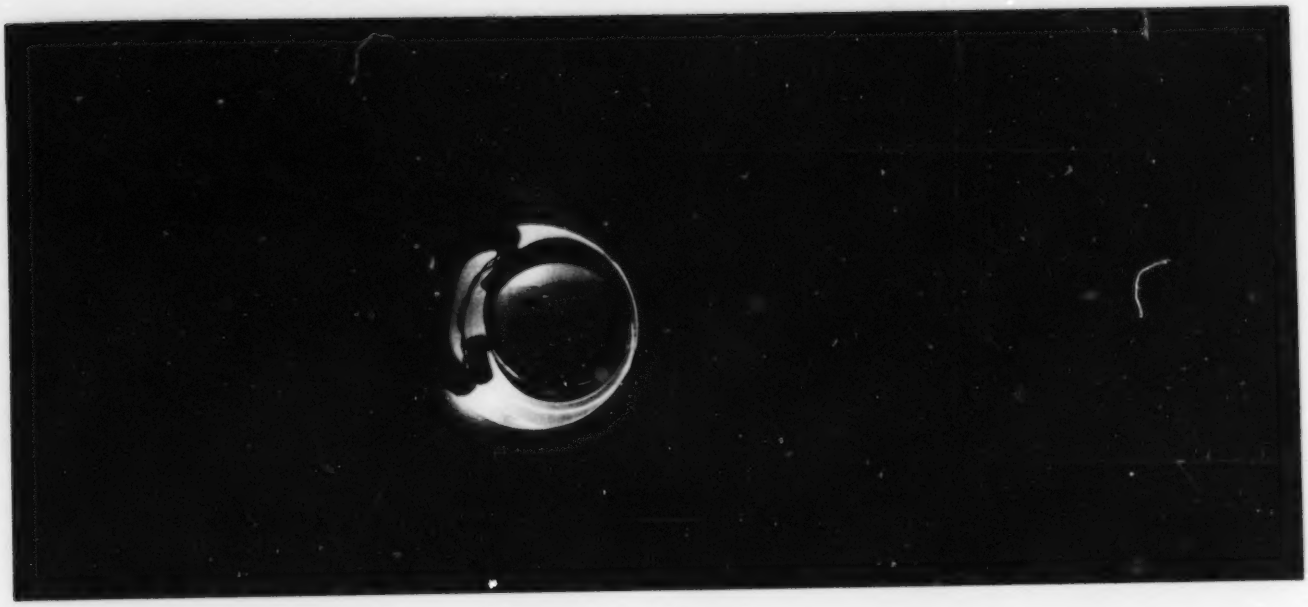
COMPLEX INSTRUMENTS are required for the solution of many complex problems. Instrument makers Rudy Heinze (standing) and Werner Ostwald (seated) design, build and service many delicate and minute pieces of gear required in SRC's research program. The skills and facilities of SRC's precision instrument shop have been utilized by clients from across the country.

WATER ANALYSES are vital in determining the quality of a water supply. Bill Darrach measures the sulphate content in one of the hundreds of water samples submitted to SRC annually from a variety of clients.

MAINTAINING EQUIPMENT for field programs is one of the many tasks performed by SRC's machine shop. Ken Owens (kneeling) completes repairs to a field trailer door while George Bromberg, shop foreman, looks on.



ELECTRONIC EQUIPMENT of a specialized nature is required in many of SRC's programs, particularly those involving outdoor work in Saskatchewan's severe environment. Don Barnett (right) and Steve Pershyn (left) service, test, design and build much of this equipment.



THE FUTURE

What of the future?

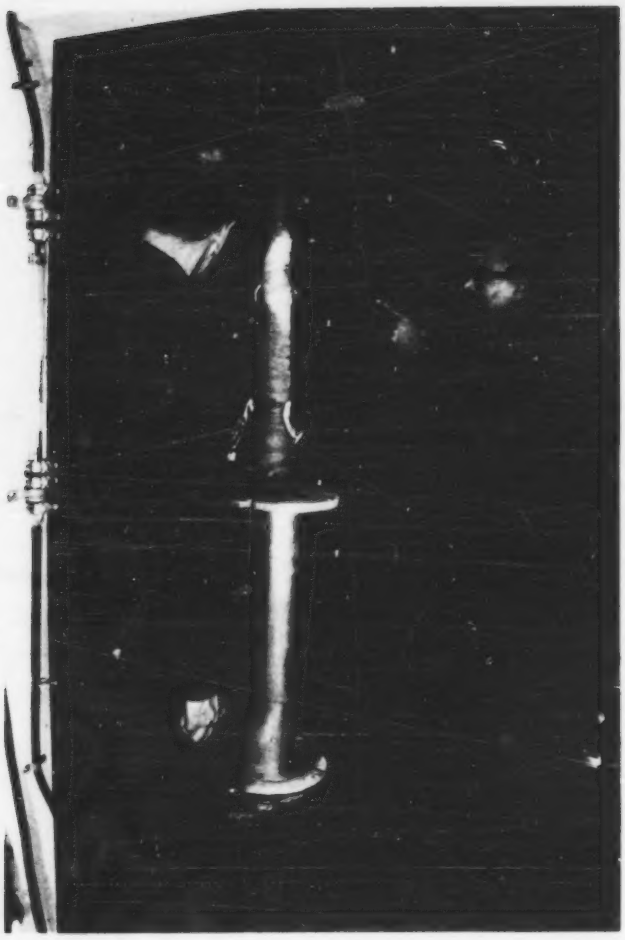
The future technical problems of Saskatchewan are the future problems of the Saskatchewan Research Council. There are some aspects of the future that are fairly certain:

- transportation problems will be an important aspect of Saskatchewan life for many years to come;
- agriculture is still, and will remain, of fundamental importance to the province far into the future;
- lignite will become an increasingly imporant energy source, unless there are dramatic new technological developments;
- our environment will require further definition and continuous monitoring;
- water supplies, of sufficient quantity and quality to satisfy envisaged demands at competitive prices, will present problems in the provinces less favored areas for years to come.
- If the province's secondary industrial base is to strengthen and expand, research support for industry will have to expand proportionally.

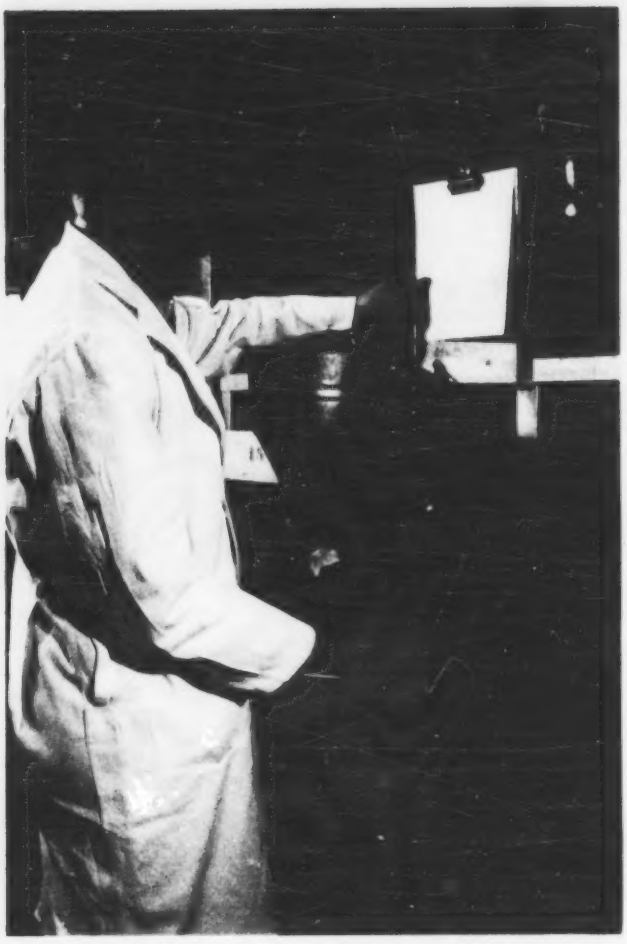
In the past, the Saskatchewan Research Council's share of the provincial budget has been about ¼ per cent to 3/10 per cent of the annual total expenditure by the provincial government. The level of priority attached to technological problems must determine the level of effort devoted to their solution.

As far as can be foreseen, it appears that the *program areas* of water, environment, minerals, transportation and information will remain relevant to the province and therefore to the Council well into the future. Different *aspects* of these fields will require work depending on changes in economic, environmental and technical factors.

To cope with the uncertainties of the future, it is essential that the Council remain as flexible and versatile as possible. As well as continuing to function, on request, as the research arm of provincial government departments, S.R.C. seeks to continue its internally initiated research program in co-operation, where appropriate with other research groups. In order to foster and expand industrial activity, S.R.C. seeks new clients in this area. Also, S.R.C. seeks further recognition as local experts on the regional aspects of appropriate national technological problems.



SODIUM SULPHATE REDUCTION experiments in the university's chemistry and chemical engineering department are supported by an SRC grant. Professors N. N. Bakshi (left) and W. J. DeCoursey are shown examining a fluidizing bed apparatus used in the study. This equipment is located in the SRC pilot plant. Close co-operation between SRC and university scientists exists in many areas.



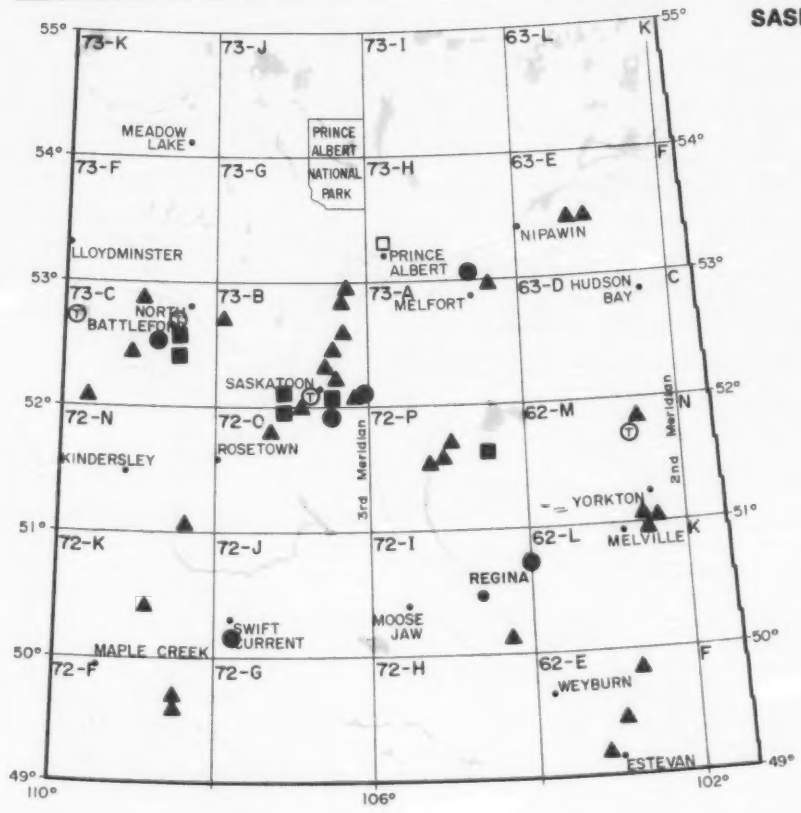
ANIMAL NUTRITION is an important factor in Saskatchewan's agricultural economy. Dr. J. M. Bell, head of the university animal science department, is shown feeding pea meal milk replacer to calves in an experiment designed to test its nutritional value. This research is supported by an SRC grant.

In summary, Andrew H. Wilson says in his background study for the Science Council of Canada entitled *Research Councils in the Provinces: A Canadian Resource:*

" . . . Research Councils have served the economies of the provinces but, increasingly, they are tending to look more closely at the needs of society and of the physical environment. And by becoming increasingly more interested in innovation-oriented activities, they have become increasingly more directly concerned about the marketplace and about the creation of employment opportunities . . ."

" . . . Provincial Research Councils are unique to Canada. They have also played and can (still) play a unique role in the economic betterment, welfare and progress of Canada. They satisfy the regional needs of Canada . . ."

LOCATION OF SASKATCHEWAN RESEARCH COUNCIL FACILITIES



EXPLANATION

- ▲ Observation well
- □ Topoclimatological station
- ● Slough study
- Ⓣ Tritium study
- ■ Watershed